What is claimed is:

1. An apparatus for monitoring the presence of an analyte in a closed vial comprising:

   1 a vial feeding mechanism;

   2 a conveyor operatively associated with the vial feeding mechanism for receiving vials from the vial feeding mechanism;

   3 an analyzer operatively associated with the conveyor for determining a value of a spectral property at a position within headspaces of the vials, the spectral property being dependent on analyte concentration; and

   4 an indicator operatively associated with the analyzer and the conveyor for indicating vials wherein the presence of the analyte is detected as product vials and for indicating vials wherein the absence of the analyte is detected as rejected vials.

2. The apparatus of Claim 1 comprising a transporter operatively associated with the vial feeding mechanism for receiving vials from the vial feeding mechanism and operatively associated with the conveyor for transferring vials to the conveyor.

3. The apparatus of Claim 2 comprising a first vial counter operatively

associated with the transporter for counting the number of vials received by the transporter.

4. The apparatus of Claim 1 comprising a transferrer for receiving vials from the conveyor.

5. The apparatus of Claim 4 comprising a reject station operatively associated with the transferrer for receiving rejected vials from the transferrer.

6. The apparatus of Claim 4 comprising a second vial counter operatively associated with the transferrer for counting the number of vials received by the transferrer.

7. The apparatus of Claim 4 comprising a sampler operatively associated with the transferrer for removing sample collection vials from the transferrer.

8. The apparatus of Claim 7 comprising a third vial counter operatively associated with the sampler for counting the number of vials received by the sampler.

9. The apparatus of Claim 7 comprising a sample collection station operatively associated with the sampler for receiving the sample collection vials from the sampler.

10. The apparatus of Claim 4 comprising a labeler operatively associated with the transferrer for labeling product vials received from the transferrer.

11. The apparatus of Claim 1 wherein the analyte comprises a perfluorocarbon gas.

12. The apparatus of Claim 11 wherein the perfluorocarbon gas comprises perfluoropropane.

13. The apparatus of Claim 1 further comprising a separator situated between the vials on the conveyor, such that the signal from the analyzer does not saturate the indicator as the vials are moved through the optical path of the analyzer.

14. A method for monitoring the presence of an analyte in a closed vial comprising the steps of:

1. conveying a sample contained within the closed vial to an analyzer;
2. determining a value of a spectral property dependent on analyte concentration at a position within a headspace formed above the sample within the vial;
3. comparing the measured value of the spectral property with a predetermined limit criteria to determine the presence of the analyte;
4. indicating vials wherein the presence of the analyte is detected as product vials and indicating vials wherein the absence of the analyte is detected as rejected vials;
5. conveying the rejected vials to a rejected vial station;
6. conveying a first portion of the product vials to a sample collection station; and
7. conveying a second portion of the product vials to a labeler.

15. The method of Claim 15 wherein the analyte comprises a

perfluorocarbon gas.

16. The method of Claim 16 wherein the perfluorocarbon gas comprises perfluoropropane.

17. A method for monitoring the presence of an analyte in a headspace of a sample vial comprising the steps of:

1. performing a first spectral analysis of an analyte contained within a headspace of a test vial, wherein the concentration of the analyte in the headspace is at a predetermined level;
2. identifying a spectral region containing an absorption peak specific for the analyte in the headspace of the test vial from the first spectral analysis;
3. determining a first intensity for the identified spectral region from the first spectral analysis;
4. performing a second spectral analysis of gas contained within a headspace of a sample vial containing a sample;
5. determining a second intensity for the identified spectral region from the second spectral analysis;
6. comparing the second intensity with the first intensity to determine the presence of the analyte in the headspace of the sample vial.

18. The method of Claim 17 wherein the spectral region identified is an infrared spectral region.

19. The method of Claim 17 wherein the first and second intensities are determined from a height of the absorption peak.

20. The method of Claim 17 wherein the first and second intensities are

determined from an area of the absorption peak.

21. The method of Claim 20 wherein the area of the absorption peak is determined using a partial least squares algorithm or a peak height algorithm.

22. The method of Claim 17 wherein the analyte comprises a perfluorocarbon gas.

23. The method of Claim 22 wherein the perfluorocarbon gas comprises perfluoropropane.

24. An apparatus for quantitatively monitoring the presence of an analyte in a closed vial comprising:

1. a vial feeding mechanism;
2. a conveyor operatively associated with the vial feeding mechanism for receiving vials from the vial feeding mechanism;
3. an analyzer operatively associated with the conveyor for determining a value of a spectral property at a position within headspaces of the vials, the spectral property being dependent on analyte concentration; and
4. an indicator operatively associated with the analyzer and the conveyor for indicating vials wherein the presence of the analyte is measured quantitatively and detected as product vials, and for indicating vials wherein the quantity of analyte measured is different than the analyte in the product vials, these vials are detected as rejected vials.

25. The apparatus of Claim 24 comprising a transporter operatively

associated with the vial feeding mechanism for receiving vials from the vial feeding mechanism and operatively associated with the conveyor for transferring vials to the conveyor.

26. The apparatus of Claim 25 comprising a first vial counter operatively associated with the transporter for counting the number of vials received by the transporter.

27. The apparatus of Claim 24 comprising a transferrer for receiving vials from the conveyor.

28. The apparatus of Claim 27 comprising a reject station operatively associated with the transferrer for receiving rejected vials from the transferrer.

29. The apparatus of Claim 27 comprising a second vial counter operatively associated with the transferrer for counting the number of vials received by the transferrer.

30. The apparatus of Claim 27 comprising a sampler operatively associated with the transferrer for removing sample collection vials from the transferrer.

31. The apparatus of Claim 30 comprising a third vial counter operatively associated with the sampler for counting the number of vials received by the sampler.

32. The apparatus of Claim 30 comprising a sample collection station operatively associated with the sampler for receiving the sample collection vials from the sampler.

33. The apparatus of Claim 27 comprising a labeler operatively associated with the transferrer for labeling product vials received from the transferrer.

34. The apparatus of Claim 24 wherein the analyte comprises a perfluorocarbon gas.

35. The apparatus of Claim 34 wherein the perfluorocarbon gas comprises perfluoropropane.

36. The apparatus of Claim 34 further comprising a separator situated between the vials on the conveyor, such that the signal from the analyzer does not saturate the indicator as the vials are moved through the optical path of the analyzer.

37. A method for quantitatively measuring an analyte in a closed vial comprising the steps of:

1. conveying a sample contained within the closed vial to an analyzer;
2. determining a value of a spectral property dependent on analyte concentration at a position within a headspace formed above the sample within the vial;
3. comparing the measured value of the spectral property with a predetermined limit criteria to determine the quantity of the analyte;
4. indicating vials wherein the desired quantity of analyte is detected as product vials and indicating vials wherein the undesired quantity of analyte is detected as rejected vials;
5. conveying the rejected vials to a rejected vial station;
6. conveying a first portion of the product vials to a sample

collection station; and

7. conveying a second portion of the product vials to a labeler.

38. The method of Claim 37 wherein the analyte comprises a perfluorocarbon gas.

39. The method of Claim 38 wherein the perfluorocarbon gas comprises perfluoropropane.

40. A method for quantitatively monitoring the presence of an analyte in a headspace of a sample vial comprising the steps of:

1. performing a first spectral analysis of an analyte contained within a headspace of a test vial, wherein the concentration of the analyte in the headspace is at a predetermined level;
2. identifying a spectral region containing an absorption peak specific for the analyte in the headspace of the test vial from the first spectral analysis;
3. determining a first intensity for the identified spectral region from the first spectral analysis;
4. performing a second spectral analysis of gas contained within a headspace of a sample vial containing a sample;
5. determining a second intensity for the identified spectral region from the second spectral analysis;
6. comparing the second intensity with the first intensity to determine the quantity of the analyte in the headspace of the sample vial.

41. The method of Claim 40 wherein the spectral region identified is an infrared spectral region.

42. The method of Claim 40 wherein the first and second intensities are determined from a height of the absorption peak.

43. The method of Claim 40 wherein the first and second intensities are determined from an area of the absorption peak.

44. The method of Claim 43 wherein the area of the absorption peak is determined using a partial least squares algorithm or a peak height algorithm.

45. The method of Claim 40 wherein the analyte comprises a perfluorocarbon gas.

46. The method of Claim 45 wherein the perfluorocarbon gas comprises perfluoropropane.

47. The method according to claims 14, wherein the analyte comprises a gas selected from the group: fluorinated gas, fluorocarbon gas and perfluorocarbon gas.

48. The method according to claims 14, wherein the analyte comprises a perfluorocarbon gas selected from the group: perfluoromethane, perfluoroethane, perfluoropropane (PFP), perfluorobutane, and perfluoropentane, perfluorobutane, heptafluoropropane and mixtures thereof.

49. The method according to claims 14, wherein the analyte comprises a fluorinated liquid.

50. The method according to claims 14, wherein the analyte comprises a

fluorinated liquid selected from the group consisting of: liquid perfluorocarbon and liquid perfluoroether.

51. The method according to claims 49, wherein the fluorinated liquid is selected from the group consisting of: perfluorohexane, perfluoroheptane, perfluorooctane, perfluorononane, perfluorodecane, perfluorododecane, perfluorocyclohexane, perfluorodecalin, perfluorododecalin, perfluorooctyliodide, perfluorooctylbromide, perfluorotripropylamine, perfluorotributylamine, perfluorobutylethyl ether, bis(perfluoroisopropyl) ether and bis(perfluoropropyl) ether, and mixtures thereof.

52. The method according to claims 14, wherein the vial is a plastic vial capable of affording a spectral window through which specific analytes may be detected.